Cultural Resource Investigations for Waste Area Group 5 on the Idaho National Engineering and Environmental Laboratory

1. INTRODUCTION

The Idaho National Engineering and Environmental Laboratory (INEEL) is an 890 square mile multiprogram Department of Energy (DOE) laboratory in southeastern Idaho. Over the past 50 years, the laboratory has witnessed many significant scientific advances, particularly in the areas of nuclear propulsion, nuclear reactor safety and design, and waste management. As a result of this long history, various areas of the INEEL have potential and actual cleanup needs. To guide and ultimately expedite environmental restoration of contaminated areas, the INEEL is divided into ten "Waste Area Groups" (WAGs). The levels of cleanup and remediation, and schedules for the proposed environmental restoration within these WAGs will be determined by looking at projected future land uses in consultation with local regulators and stakeholders. In general, some areas may be remediated to risk levels associated with potential future agricultural or commercial uses, while other areas may be considered for permanent industrial use or long term access restriction.

Waste Area Group 5 (WAG 5) includes the Power Burst Facility (PBF) and a decommissioned research reactor area called the Auxiliary Reactor Area (ARA) (Figure 1-1). Potential contamination in WAG 5 is largely confined to tanks and components of wastewater disposal systems (e.g., evaporation ponds, percolation ponds, leach fields, pits, and dry wells). Surface and subsurface contaminants include radionuclides (cesium-137, cobalt-60, europium-152, europium-154, europium-155, americium-241, plutonium-239, plutonium-240, uranium-234, uranium-235, uranium-238, and strontium-90), metals (barium, beryllium, chromium, nickel, silver, and zinc), volatile organic compounds (1,1-dichloroethene, trichloroethene, tetrachloroethene, and toluene), semivolatile organic carbons (diethylphthalate), and polychlorinated biphenyls (DOE-ID 1996).

Cleanup activities within WAG-5 have been ongoing since 1993 and have included the removal of radioactively contaminated soils from a wastewater disposal pond, the removal of a contaminated sump, and the removal of contents from a contaminated septic system. In addition, a multi-layer engineered barrier was placed over the site of the Stationary Low-Power Reactor Number 1 and new fences were erected to prevent inadvertent exposure of the waste buried below. Most recently, contaminated soils have been removed from several areas at PBF and ARA. In general, the cleanup activities within WAG 5 have been designed to allow continued use as a permanent industrial area (DOE-ID 1996).

Cultural resource investigations within WAG-5 were initiated in the mid-1980s. The first projects were associated with an INEEL-wide effort to identify archaeological resources within and near major operating facilities. In the mid-1990s, a similar effort was initiated to identify historic properties within the built environment at the INEEL. These efforts are ongoing as are those which seek to identify Native American cultural resources. Throughout the years, surveys and archaeological investigations that have been directly linked to proposed ground disturbing activities, such as the cleanup work described above, have also been frequent and continue to this day.

All of the cultural resource investigations completed to date within WAG-5 have been tied directly to a variety of legal mandates that require federal agencies, like the Department of Energy, to

assess the potential impacts of ground disturbing projects under their sponsorship. The following is an abbreviated list of laws and directives that mandate consideration of cultural resources in this process of assessment (see Miller 1995 for a summary):

- National Historic Preservation Act, 1966 (36 CFR 60-68, 800)
- National Environmental Policy Act, 1969 (40 CFR 1500-1508)
- Executive Order 11593, 1971
- Archaeological and Historic Preservation Act, 1974
- Archaeological Resources Protection Act, 1979
- US Department of Energy Memorandum EH-231
- Native American Graves Protection and Repatriation Act, 1990
- Executive Order 13007, 1996

A wide variety of important cultural resources have been identified and preserved within WAG-5 as a result of these investigations. Archaeological surveys have revealed a multitude of campsites created by Native American hunter-gatherers over a period of time in excess of 12,000 years. The Shoshone-Bannock Tribes, whose aboriginal territories included the INEEL region, find many sites in this inventory to be of ancestral, traditional, and sacred importance. A variety of natural features are also significant to the Tribes. Many of the buildings that stand in isolated clusters within WAG-5 are historically significant as well and several are worthy of detailed documentation for inclusion in the permanent Historic American Engineering Record archives housed within the US Library of Congress.

In the report to follow, all of the known cultural resources within WAG-5 will be described and the investigations that prompted their discovery will be summarized. Three main cultural resource types are discussed: archaeological resources, Native American cultural resources, and historic buildings and structures. The report concludes with a discussion of especially sensitive areas identified within WAG-5, data gaps, and recommendations for enhancing cultural resource protection and stewardship in the area.

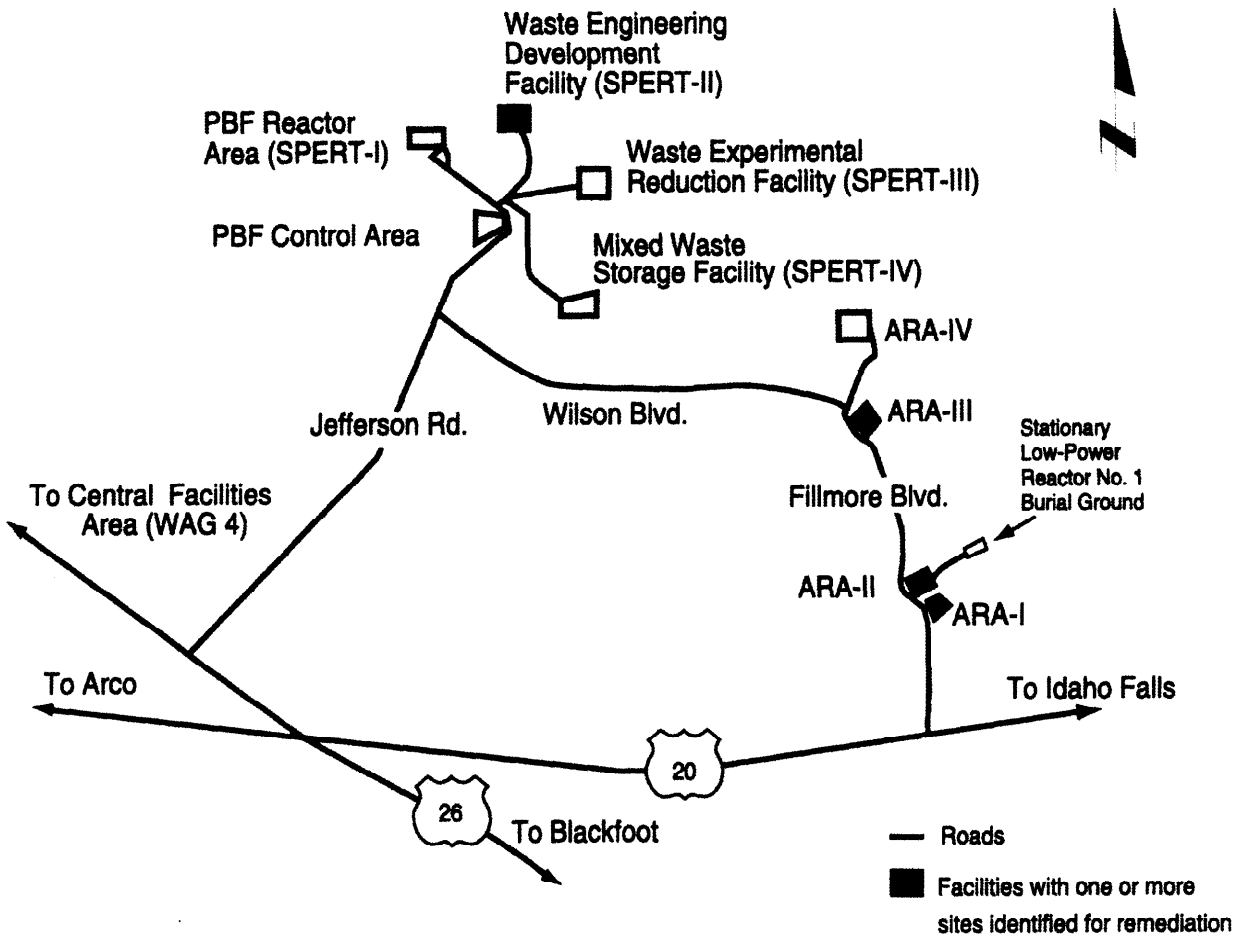

Figure 1-1. General vicinity of WAG 5 on the INEEL.

2. WASTE AREA GROUP 5 SETTING

The facilities that make up Waste Area Group 5 on the INEEL are located in the south-central portion of the facility. The unique natural and cultural features of the area are described below.

2.1 Natural Setting

The INEEL is situated along the northwestern edge of the eastern Snake River Plain at an average elevation of about 4920 ft. The Lost River and Lemhi Ranges, and the mouths of the Big Lost River and Little Lost River Valleys bound the west and northwest portions of the facility complex. The southernmost tip of the Bitterroot Range and the wide mouth of the Birch Creek Valley form the northeastern boundary. The eastern and southern edges of the INEEL are contiguous with the sagebrush rangelands of the Snake River Plain but are punctuated by three predominant topographic features (Big Southern, Middle, and East Buttes), which dominate the horizon from any vantage point on the INEEL and served as important prehistoric and historic landmarks. Middle and East Buttes, also known locally and historically as the Twin Buttes, are within the INEEL boundary. Big Southern Butte, which rises nearly a thousand feet above the surrounding desert floor, is a short distance to the south.

While the buttes are the most conspicuous among the many reminders of the volcanic origin of the Snake River Plain, many smaller buttes and cinder cones also dot the landscape and lava outcrops, and lava tubes are common features of the rolling and broken terrain. Additional variation is provided by small seasonal playas which form in low areas where surface runoff collects. The jagged features of several more recent lava flows including the Cerro Grande flow which was formed nearly 13,000 years ago and intrudes into the southern portion of the facility, also add to the landscape.

Although volcanic features dominate much of the contemporary landscape of the INEEL, a substantial portion of the facility is contained within the Pioneer Basin. Prior to upstream irrigation demands, three major perennial streams drained into this closed basin: the Big Lost River, Little Lost River, and Birch Creek. All of these water courses terminate on or near the INEEL in natural wetland sink areas where all surface water either evaporates or infiltrates into the underground Snake River Plain aquifer.

The Big Lost River enters the southwestern corner of the INEEL and meanders some 31 miles across the facility before reaching a large sink area at the foot of the Lemhi Mountains. Due to upstream irrigation demands, the Big Lost now only conducts water during the wettest of years. Even so, extensive deposits of alluvial material and a myriad of abandoned stream channels and meander scars testify to higher water levels in the past, and it is likely that minimum year-round stream flows were maintained prior to modern changes upstream. Both Birch Creek and the Little Lost River approach the INEEL from the wide mountain valleys to the north of the facility. The Little Lost terminates in a small playa just north of the facility boundary and, in rare years, Birch Creek terminates in a large sink area that is contiguous with the Big Lost River Sink.

During most of the Holocene, the playas of the Lost Rivers and Birch Creek formed extensive wetlands that supported a diversity of plants and animals. Now, as a result of extensive upstream diversion, water flows into these areas only during years when precipitation is well above normal, so the wetlands are a mere shadow of what they probably once were. Even further back in time, during the wetter conditions of the Pleistocene, these sink areas were completely submerged by the shallow waters

of Lake Terreton, a large freshwater lake. The shoreline of this immense inland lake was roughly coincident with the 4800 ft contour and the shallow waters extended for many miles to the east.

Plant life on the INEEL is strongly influenced by topography and climate. This is cold desert country, characterized by large daily and seasonal temperature fluctuations and low precipitation rates. The average annual temperature is 42 degrees Fahrenheit and diurnal temperature fluctuations often exceed 20 degrees. Mean annual precipitation is only 9 inches and most of that falls as early spring rain. These conditions and the local topography support a range of vegetation communities including wetlands as you see here, shadscale steppe conditions in the old lakebed deposits, sagebrush-grassland communities across the Pioneer Basin and into the lava plains, and juniper-sagebrush woodlands located along the foothills of the buttes and nearby mountains. Although the boundaries of these general communities have migrated in response to available moisture, palynological data indicate their continued presence since the Late Pleistocene glacial periods.

The INEEL supports a faunal community generally typical of the Great Basin high desert and is home to some 239 resident and seasonal vertebrate species. Birds constitute the largest single class of wildlife in this census, although many of these are migratory, attracted to the area by the now seasonal wetlands of the Big Lost River and Birch Creek Sinks. Others, like sage grouse, are common all year. Small mammals (mice, rabbits, ground squirrels, marmots) are the most common year-round residents but big game animals, including antelope, elk, and deer are probably the most visible. Mammoth, camel and bison also once occupied the area. Predators, such as bobcat, coyote, and raptors, occur in typically modest numbers. The cool desert climate is also host to a surprisingly diverse aquatic community including at least six species of fish (e.g., trout, whitefish, and kokanee salmon) in the Lost Rivers and Birch Creek as well as a thriving community of water-loving birds, toads, tadpole shrimp, and other creatures that inhabit the playas and sinks.

Waste Area Group 5 facilities are situated within the lava flows that dominate the south-central portion of the INEEL, south and east of the Big Lost River floodplain. Sandy wind-blown soils have accumulated among the lava flows here, occasionally forming dune deposits. Many small playas where surface water accumulates on a seasonal basis are also present.

2.2 Cultural Setting

Although the INEEL area may seem rather desolate and harsh to the casual viewer and it was certainly dreaded by early homesteaders, the rich archaeological record preserved there is testament to the importance of the region and its many resources to past hunting and gathering populations. In fact, there are an average of about 63 prehistoric archaeological sites per square mile across the INEEL and in some environmental zones, along permanent water for example, that figure jumps to 218 sites per square mile. These sites range in age from 150 – 12,000 years and almost all of them are classified as lithic scatters or short term camps, which is to say that all are roughly characterized by moderate to dense concentrations of lithic debris, projectile point fragments, and processing tools (scrapers, knives, general utility biface fragments). Many also contain domestic artifacts such as fire-cracked rock, burned bone, and some pottery, but ground stone tools are rare and almost always consist of implements that appear to have been used for pounding rather than grinding.

The cultural chronology for the INEEL region is broken into three major periods (Early, Middle, and Late) which are marked by major changes in weapons systems and in the morphology of the projectile point forms that were used. A fourth period, the Protohistoric, begins with the first appearance

of Euroamerican trade goods in archaeological assemblages that still reflect a primary reliance on traditional hunting and gathering practices. Figure 2-1 graphically summarizes these periods.

The earliest occupants of the INEEL region probably arrived during the Late Pleistocene some time around 12-13,000 years ago when Lake Terreton was probably, at maximum extent, covering the entire north end of the INEEL and extending far to the east. These big game hunters employed a spear technology to bring down a variety of animals including mammoth, camel, and bison. Large lanceolate points of several varieties are the diagnostic time markers.

Around 7500 years ago, the large spear points characteristic of Pleistocene big game hunting were almost entirely replaced by smaller notched and stemmed forms. This transition probably represents the adoption of a spear throwing technology, which may have been more effective in exploiting newly evolved species of smaller and swifter-footed mammals that are common on or around the INEEL today. Projectile point forms from these contexts suggest that this was a time of some cultural reorganization and mobility in the INEEL region. The archaeological record reflects this in a proliferation of point styles, which appear to have correlates in surrounding regions. It appears that people from these places were moving in and out of the eastern Snake River Plain, perhaps in response to rapidly changeable environmental conditions. Pollen records support the idea of some environmental change, but also suggest that essentially modern conditions persisted throughout the entire period.

Small arrow points and pottery are the hallmarks of the Late Prehistoric period on the INEEL. Once again, influences from surrounding regions are seen in the point styles that are present. Modern environmental conditions prevailed throughout this period and subsistence strategies appear to have changed little. The nomadic hunting and gathering lifestyle of the Late Prehistoric period continued in southeastern Idaho even after the introduction of European trade goods and horses about 2-300 years ago. However, adoption of the horse by some groups at this time led to significant changes in aboriginal lifeways. Sites from this period, the Protohistoric, are very rare on the INEEL.

All of this prehistoric archaeology was probably created by small groups of seasonally mobile hunter-gatherers who were attracted to the area by the volcanic toolstone sources of Big Southern Butte and Lemhi Point, as well as the water and food resources of the Pioneer Basin (Big Lost River drainage) and the mountain valleys further to the north. As illustrated in Figure 2-1, archaeological evidence indicates that human populations have been engaging in these types of seasonal hunting and gathering activities within the INEEL area for a span of more than 12,000 years.

The INEEL region is part of the aboriginal homeland of the Shoshone-Bannock Tribes. Tribal members today view all of the prehistoric archaeological sites present on the INEEL as ancestral and of continuing traditional and sacred importance. Although rare on the INEEL, human burial sites are of special concern. In addition to archaeological remains, many natural features of the INEEL desert are also of significance to the Shoshone-Bannock people.

The Historic period in southeastern Idaho began with infrequent visits by explorers and fur trappers in the early 1800s. By the mid 1800s, some immigrants were moving through the INEEL area as they made their way to the Oregon Territory via Goodales Cutoff, a northern spur of the Oregon Trail. In the 1860s, gold strikes in the Lost River Mountains drew many miners into the region and many stage and wagon routes were established. Small family farms appeared along the Big Lost River by 1880 and several large ranching operations were also established in what is now the northern portion of the INEEL. However, gross miscalculations of potential water flow led to the abandonment of most agricultural

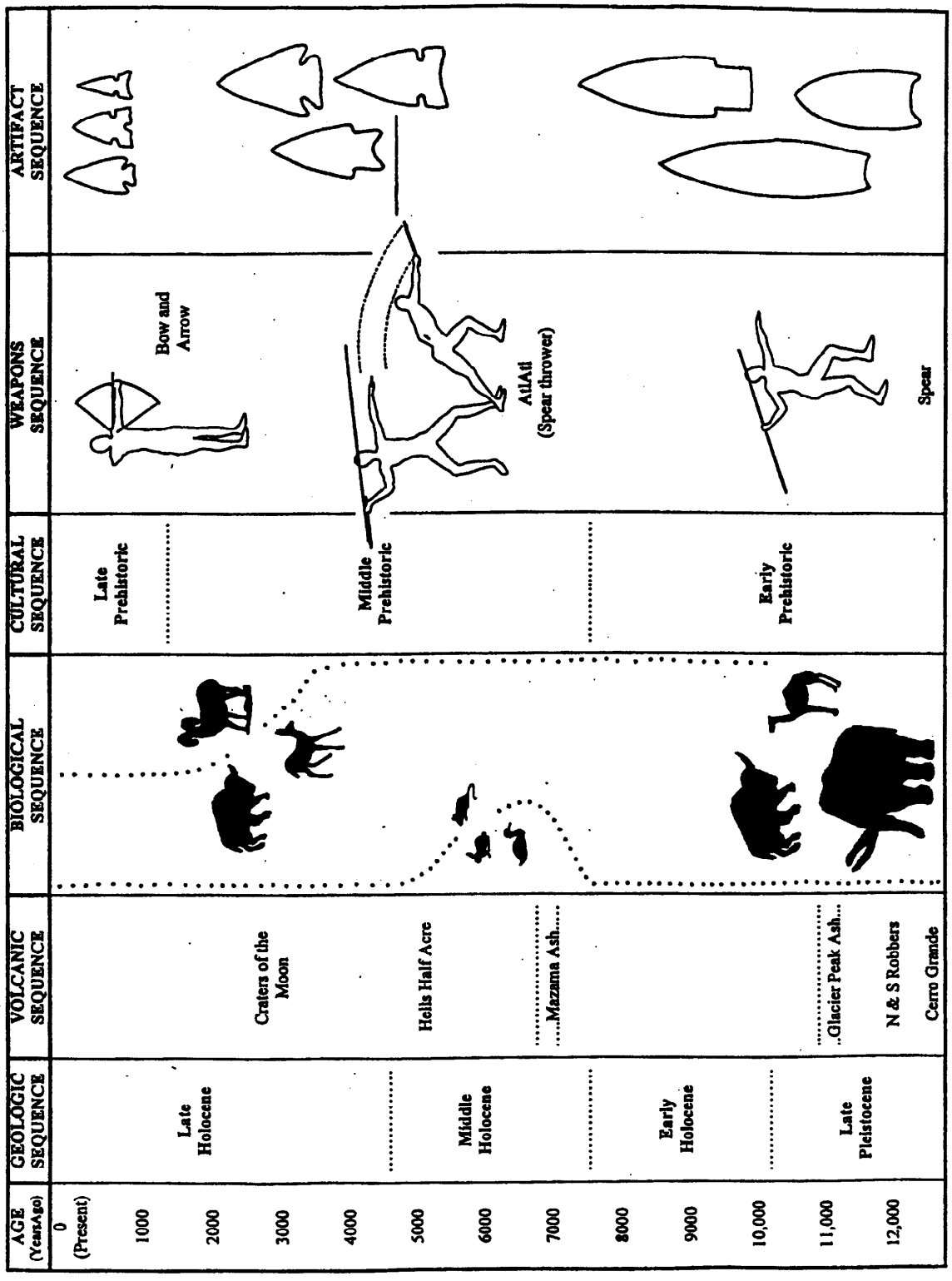

Figure 2-1. Cultural, geological, and ecological sequences of the INEEL region.

projects, even those that were federally sponsored. Since 1940, the INEEL area has been under the control of the U. S. government. Initially used during World War II as a test firing range, it was purchased by the Atomic Energy Commission (AEC) in 1959 and set aside for nuclear research. Many of the scientific facilities developed on the INEEL are historically important for their contribution to the overall development of U. S. nuclear science.

In general, early historic farmers (ca 1880 – 1930) did not enjoy the success of prehistoric hunter-gatherers in the INEEL region and the archaeological record of their occupation is relatively scanty in comparison to the prehistoric evidence. Even so, wagon trails and early roads criss-cross the area and an extensive system of canals and ditches and the campsites occupied during their construction are also common in archaeological inventories. Dilapidated homesteads and corrals occur less frequently but are quite numerous along the main channels of the Big Lost River where turn of the nineteenth century agricultural development of the area was focused. Finally, old railroad sidings represent small towns whose populations and services rose and fell, and ultimately came and went in response to the needs of local farmers and ranchers.

Most of these efforts were fairly short-lived, largely due to overestimates of available water and a failure to realize how porous the basalt bedrock really is; but the failure of these efforts actually opened the door for the Navy initially and later the AEC for development of what eventually became the INEEL. Federal interest in the INEEL area began in the 1940s when the Navy set aside a portion of the land area for the test firing of conventional weapons. Cultural resources representative of this period are mostly located at CFA and we actually have some of the only remaining World War II era structures in the state. In the late 1940s and early 1950s, the Atomic Energy Commission chose the INEEL area as a testing ground for its newly developing nuclear reactor program. Cultural resources from this era are largely focused on development of peaceful applications of nuclear power. In fact, from a historical perspective, it is safe to say that all of the commercial power reactors in the world have been influenced by experiments in safety and reactor design conducted at the INEEL by 52 unique reactors built over the past 50 years. Significant contributions to more recent nuclear history have also been made in the area of nuclear propulsion.